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ANNUAL REPORT
METALS AND CERAMICS INFORMATION CENTER

JULY 1978

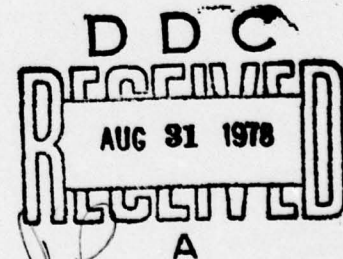
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ANNUAL REPORT - CONTRACT DSA900-76-C-2471

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Prepared for

ARMY MATERIALS AND MECHANICS RESEARCH CENTER
Watertown, Massachusetts 02172



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SUMMARY

The Metals and Ceramics Information Center (MCIC) is one of several technical information analysis centers (IAC's) chartered and sponsored by the Department of Defense (DoD). The objective of the Center is to increase the productivity of scientists, engineers, and technicians engaged in scientific and engineering programs for the DoD. The Center is responsible for the collection, review, analysis, appraisal and summary of the available scientific and technical information and data on selected metals and ceramics and composites containing those materials. The resources and capabilities of MCIC, a full-service IAC, are also available to the technical community at large through an extensive program of products and services.

This final report on Contract No. DSA900-76-C-2471 covers the period of activities from May 1, 1976, through April 30, 1978. During this 24-month contract period, the Center met its contractual goal for recovery of products and service costs through direct (58.6 percent) and indirect (14.6 percent) incomes. A substantial portion of MCIC's income continues to come from the special studies and tasks undertaken for Federal agencies; 17 studies/tasks were performed in this report period.

In addition to the information acquisition and processing efforts, technical publications and inquiry services remain the major activities in MCIC's basic program. In January, 1977, the Newsletters and Reviews were replaced by a free Current Awareness Bulletin (CAB), now distributed to our user audience of approximately 5,000 technical personnel. The publications completed or in process consist of

- 71 current awareness periodicals (CAB/Reviews)
- 12 technical reports
- 2 new handbooks and 1 supplement to previous handbook.

The Center continued to give high priority responses to 596 requests for technical assistance (Of these incoming requests, 468 were processed and 128 were cancelled.). Of the assigned requests, 81 were subject to user charge and 387 were answered free of charge.

Utilizing the RDT&E On-Line System at the Defense Documentation Center, the information base added 7001 technical documents to the MCIC information system.

Future plans continue the primary and established products and services of the Center. The future operations include

- (1) Keeping the data base and information system current and useful
- (2) Identifying and producing specific products and services needed by the users
- (3) Developing a greater visibility of the Center
- (4) Providing cost-effective service.

PREFACE

This report was prepared by the Metals and Ceramics Information Center (MCIC) which is operated by Battelle's Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201, under Contract DSA900-76-C-2471. The MCIC program has been administered under the direction of the Defense Logistics Agency with Technical Supervision by the Army Materials and Mechanics Research Center, Watertown, Massachusetts, Mr. Sam Valencia, Contracting Officer's Technical Representative.

This report covers the period of work May 1, 1976, through April 30, 1978. The report was released by the authors July 1978.

The MCIC and Battelle management express their appreciation to those many sponsor representatives whose advice, guidance and support have been essential to the continuing success of the MCIC program. Particular mention should be made of the significant contributions of

Mr. Joseph Blue, DLA
Mr. Samuel Valencia, AMMRC

Ms. Frances Burke, DESC
Mr. Jerome Persh, OUSDRE.

ANNUAL REPORT
METALS AND CERAMICS INFORMATION CENTER

1 May 1976 – 30 April 1978

In 1971, the Metals and Ceramics Information Center (MCIC) was formed through the merger of the Defense Metals Information Center (DMIC) and the Defense Ceramic Information Center (DCIC). The former had been operated by Battelle since the mid-1950s, and the latter since 1967. Thus, although MCIC is just celebrating its seventh birthday, it represents more than 2 decades of service to the defense materials community.

As one of the family of technical information analysis centers sponsored by the Department of Defense, MCIC's purpose is to provide an authoritative source of current engineering and scientific information and data on metal and ceramic materials and composites containing those materials which may be applicable to defense systems. Although intended primarily for service to agencies of DoD and their contractors, MCIC's resources are available to the technical community at large, thus contributing to the transfer and adaptation of defense-developed technology for commercial and consumer use.

This report summarizes MCIC activities for the period May 1, 1976, through April 30, 1978, a total of 24 months, under Contract DSA900-76-C-2471. It provides a summary of the scope, objectives and organization of MCIC, its information processing and services, and a discussion of future plans for the maintenance of the Center's resource of technical knowledge in metals and ceramics. A statistical summary of expenditures for the various activities conducted in this contract period is given in Appendix A (DSAH Form 1261). This summary updates the statistics presented previously* because of costs incurred through extension of work and additional income for special studies/tasks through June 30, 1978.

Continuation of MCIC's operations for a period of up to 5 years was awarded to Battelle's Columbus Laboratories under a new contract DLA900-78-C-1715, effective May 1, 1978.

SCOPE AND PURPOSES OF MCIC

MCIC is recognized as a formal Department of Defense Information Analysis Center (IAC). As such, under the contract reported on herein, its objectives have been to provide scientific and technical information analysis services to the Department of Defense components, contractors and grantees,

* Eighth Quarterly Progress Report, dated May 26, 1978.

U.S. Government agencies and their contractors, and to the private sector. The scope includes metals, ceramics in various forms, i.e., bulk, coating or composite, which are utilized in defense systems and hardware with emphasis on critical structural applications and/or stringent environments.

The Center collects and provides its users with information on the design characteristics, applications, processing, fabrication, quality control, environmental effects, test methods, sources, suppliers, and specifications for materials within its scope.

To accomplish these objectives, the MCIC program consists of five principal functions (Figure 1):

- (1) Maintenance of a comprehensive, up-to-date, authoritative Technical Information Base
- (2) Response to requests for technical advice and assistance from Government agencies, contractors, suppliers, and the public sector
- (3) Issuance of a series of timely reviews (digests) of metals and ceramic technology on a variety of subjects within the MCIC scope
- (4) Publication of technical reports, handbooks, databooks, critical reviews and technology assessments appraising the state of the art of metals, ceramics, and processes within the MCIC scope
- (5) Conduct a variety of special studies for DoD agencies and other departments of the Federal government.

ORGANIZATION OF THE MCIC PROGRAM

The Metals and Ceramics Information Center is assigned to the Materials Information Program Office of Battelle's Columbus Laboratories. The Manager of that office also serves as Director of MCIC. Members of the permanent MCIC staff are drawn from Battelle's Materials Technology and Information Systems Departments. That full-time staff averages 20 engineers, information specialists and secretarial assistants, who are supported by nearly 100 engineers and scientists from throughout the Columbus Laboratories, contributing on a part-time basis as needed. The fundamental strength of the MCIC program lies in this team of qualified authorities, whose experience and daily participation in advanced materials research provides the Center's users with expert technical advice and authoritative state-of-the-art publications (see Figure 2).

Key MCIC staff members assigned as managers of the primary functions of the Center are shown in Figure 3.

As of July 1, 1977, Mr. Harold Mindlin replaced H. Dana Moran as program manager for MCIC. Mr. Mindlin was a Section Manager in the Battelle organization prior to assuming this position. This

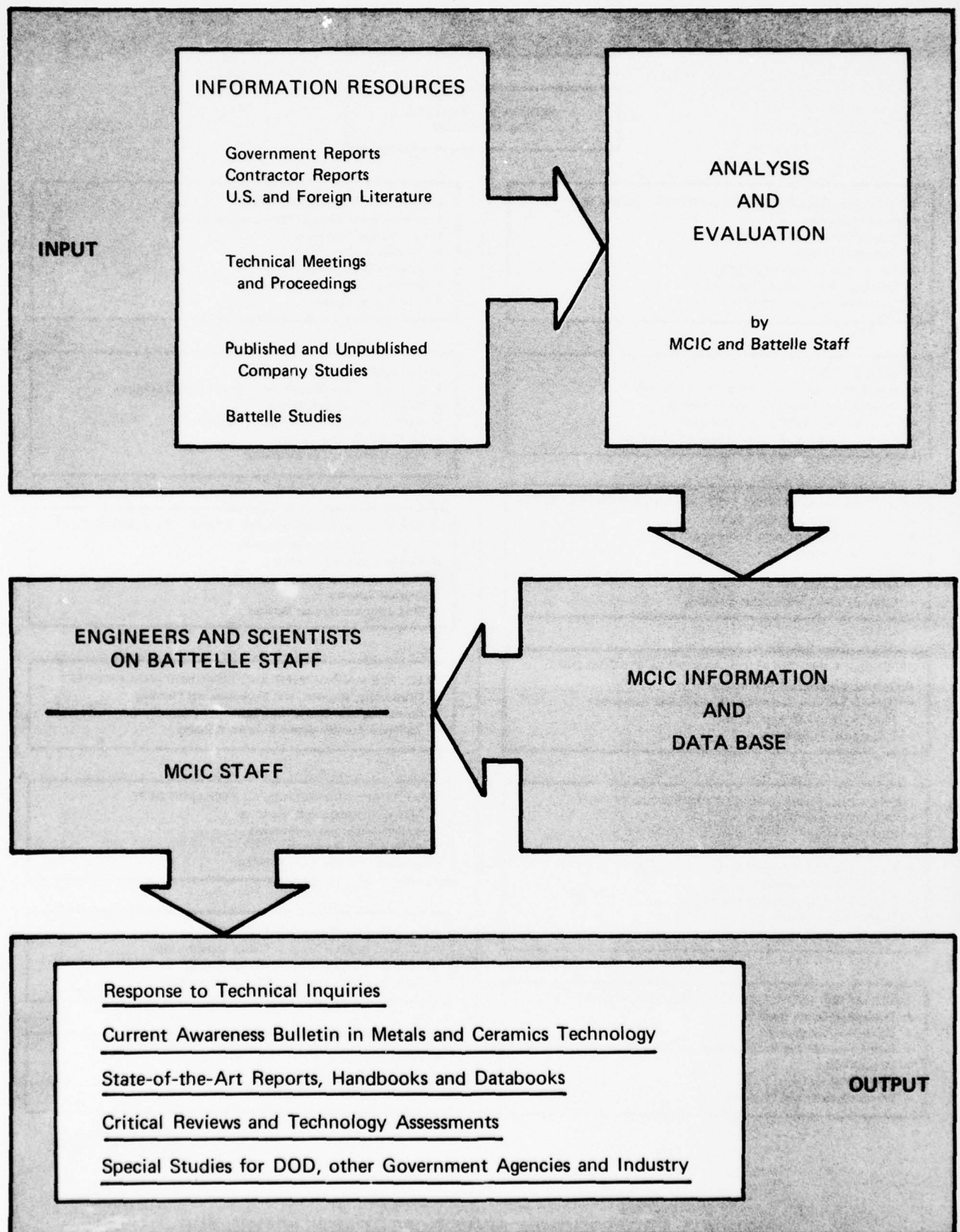


FIGURE 1. FUNCTIONS OF THE METALS AND CERAMICS INFORMATION CENTER

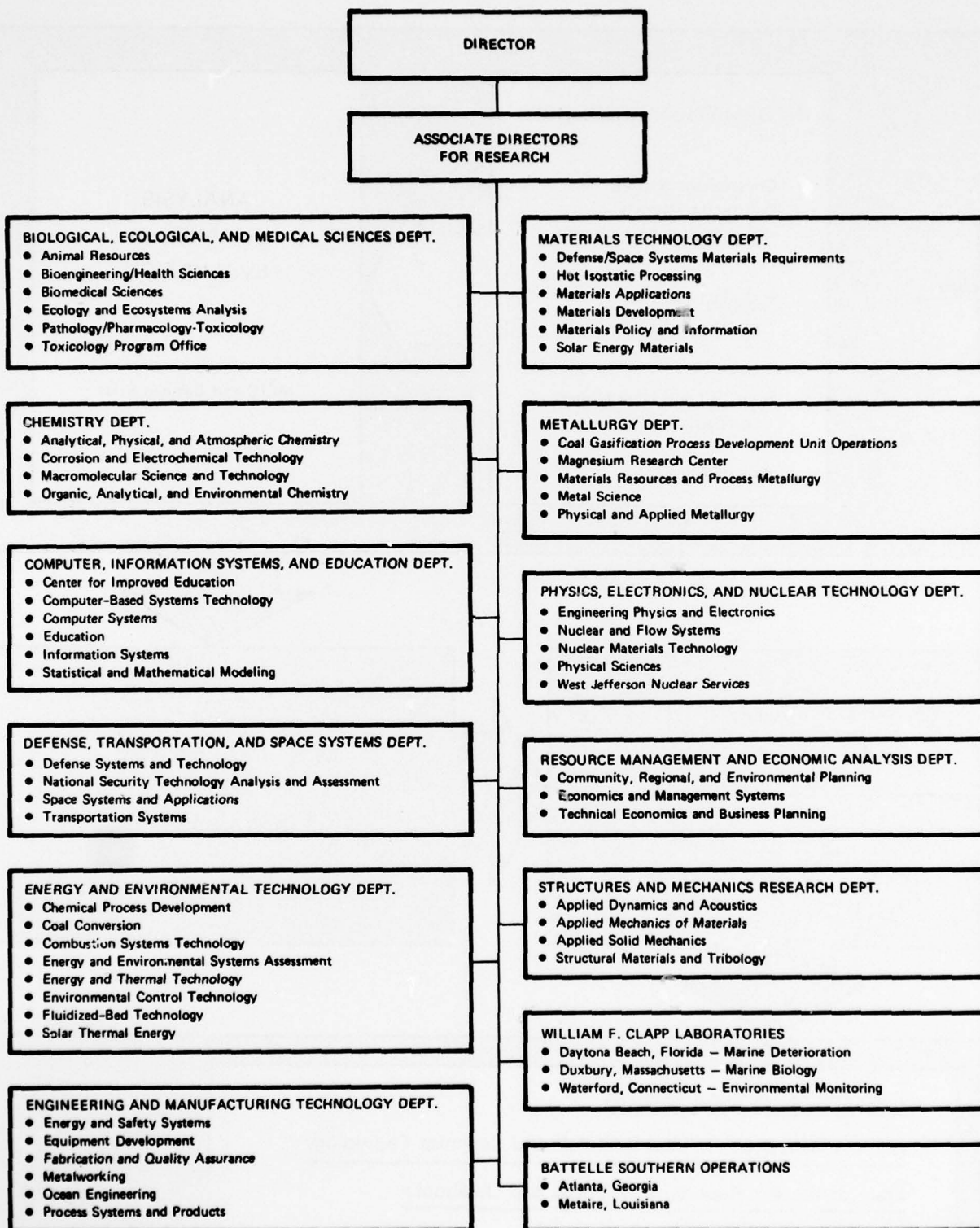


FIGURE 2. PROFESSIONAL RESOURCES OF MCIC WITHIN THE TECHNICAL ORGANIZATION OF BATTELLE-COLUMBUS

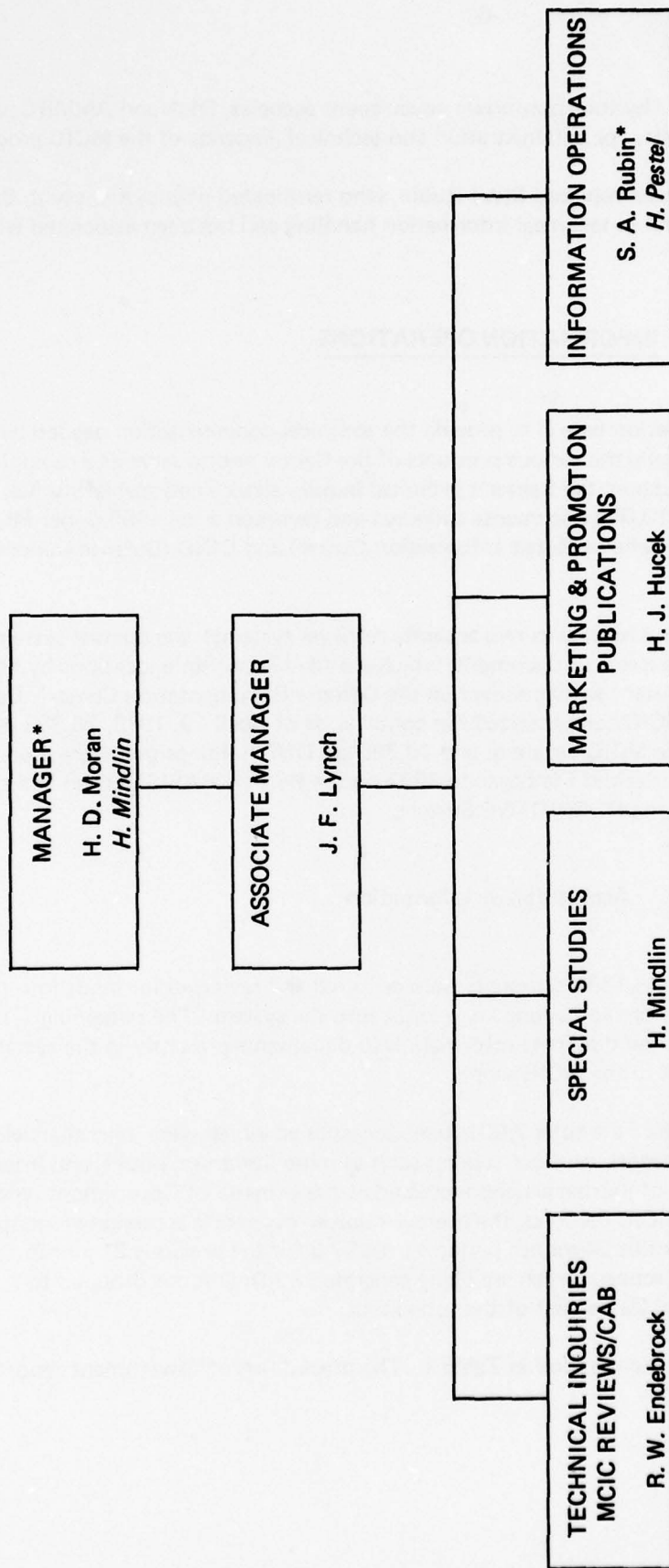


FIGURE 3. ORGANIZATION OF METALS AND CERAMICS INFORMATION CENTER

* Personnel change during contract period; see discussion below.

change in personnel was approved by the appropriate government agencies, DLA and AMMRC, who have, respectively, the responsibility for administration and technical guidance of the MCIC program.

On March 1, 1978, Mrs. Helen Pestel replaced Steve Rubin, who terminated employment with Battelle. Mrs. Pestel has a broad background in technical information handling and has been associated with MCIC since September 1972.

INFORMATION OPERATIONS

The purpose of the MCIC information base is to provide the technical documentation needed by staff scientists and engineers who compile the various products of the Center and to serve as a rapid, inexpensive retrieval mechanism to support the Center's technical inquiry service and special studies. The information base contains over 110,000 documents collected and reviewed since 1955 under MCIC and its two predecessors, DMIC (Defense Metals Information Center) and DCIC (Defense Ceramics Information Center).

The MCIC information collection is housed in two separate retrieval systems: the manual system maintained until 1971 utilizing extracts of documents which are filed in multiple locations by key words (index terms), and a computer file maintained on the Defense Documentation Center's Defense RDT&E On-Line System. The MCIC computerized file contains, as of April 19, 1978, 28,303 references of which 17,907 are unique to the MCIC program, and 10,396 are DDC holdings that were modified by enriched indexing. The computerized file began in 1971 on the Battelle BASIS System and then was connected in March 1975 to the DDC RDT&E System.

Acquisition of Information

During the 2-year contract period, 8,139 documents were acquired and reviewed for input into the MCIC data base. Of these 7,001 were accessioned and input into the system. The remaining 1,138 were rejected because they contained duplicate information to documents presently in the system or they were not considered relevant to the MCIC scope.

Figure 4 indicates the percentages of the total 7,001 items accessioned which were journal articles, government reports, conference papers, or other sources such as trade literature, books, and internal papers. Although the percentage of journal articles increased at the expense of Government reports when compared to the previous MCIC contract, the average number of reports accessioned monthly remained almost the same (95 for this 24-month period versus 97.3 for the previous 21-month contract). The percentage of the reports which are being generated by DoD funds dropped to 61 percent of the report input and 20 percent of the total input.

The MCIC Input is shown by quarterly period in Table 1. The breakdown of Government reports accessioned is as follows:

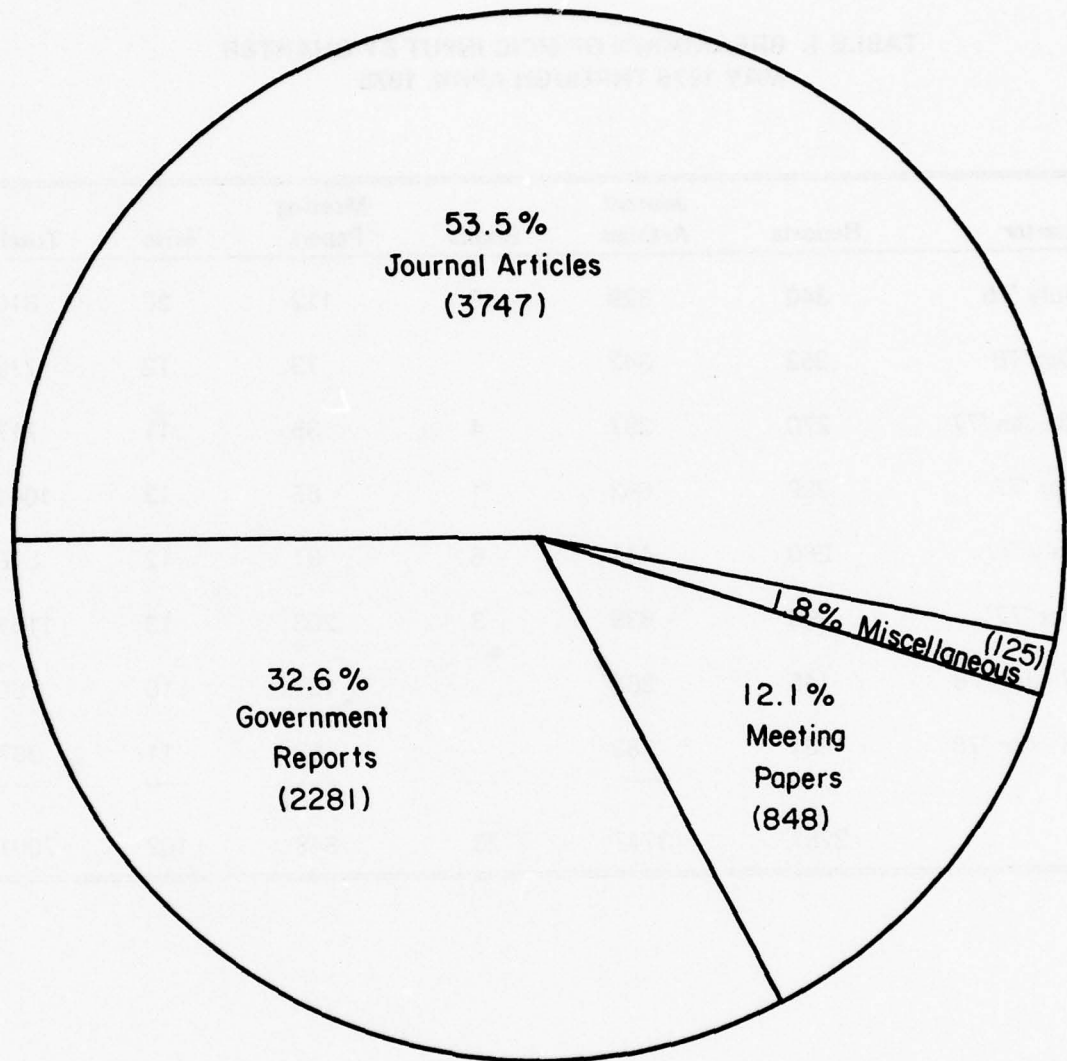


FIGURE 4. MCIC ACCESSIONS—MAY 1976 THROUGH APRIL 1978

TABLE 1. BREAKDOWN OF MCIC INPUT BY QUARTER
MAY 1976 THROUGH APRIL 1978

Quarter	Reports	Journal Articles	Books	Meeting Papers	Misc	Total
May - July '76	340	329	9	112	20	810
Aug - Oct '76	352	342		73	12	779
Nov '76 - Jan '77	270	397	4	35	11	717
Feb - Apr '77	289	653	1	85	13	1041
May - July '77	260	441	6	97	12	816
Aug - Oct '77	293	639	3	203	13	1151
Nov '77 - Jan '78	146	363		181	10	700
Feb '78 - Apr '78	331	583	—	62	11	987
	2281	3747	23	848	102	7001

	Number	Percent
DoD		
Air Force	630	27.6
Army	327	14.3
Navy	434	19.0
Total	1391	60.9
Non-DoD		
NASA	401	17.6
ERDA/DOE	200	8.8
Other	289	12.7
Total	990	39.1
Overall Total	2381	

The material orientation of the items accessioned and input into the data base is as follows: metals related, 81.5 percent; ceramics related, 8.4 percent; and composite related, 10.1 percent.

Documents of potential interest to MCIC are identified by multiple methods.

Reports—Two primary channels of acquisition are direct distribution from Government contractors and agencies and identification and ordering from Government reports announcement bulletins. An aggressive program to identify contract awards within the scope of MCIC and to secure contract reports from the source as published continues to be very successful.

Journal Literature—The Center subscribes to a couple dozen key journals on metals, ceramics, and composite materials. In addition, journals entering the Battelle library network are screened daily for articles of interest. Recently enacted copyright law changes have changed some MCIC procedures for journal literature processing. No journal articles are being distributed outside the Center, and the articles by some publishers are being abstracted by the Center staff rather than being processed with an author abstract.

Meeting Papers—Papers presented at conferences are secured by attendees from MCIC and Battelle, by purchase of proceedings, and by identification from abstracting services.

Miscellaneous—Unpublished test results, letters, trade literature, and internal memoranda are all examples of documents contained in the miscellaneous category.

To supplement the primary sources of document acquisition and the reports announcement bulletins, numerous on-line data bases can be and are tapped by the MCIC Information Processing Staff. The key bases include

- Lockheed DIALOG
- NTIS
- Chem Abstracts
- Metals Abstracts
- Engineering Index
- Defense RDT&E On-Line Systems
- Defense Documentation Center
- DOE RECON
- Nuclear Science Abstracts
- Energy Data Base.

These data bases also are used for some technical inquiries and MCIC special projects.

MCIC Data Base on RDT&E On-Line System

The growth in the number of current accessions entering the RDT&E On-Line System on a quarterly basis from the time of conversion and input processing to this system (1975) to the present is depicted in Figure 5. The average per quarter for each year is plotted along with the actual quarterly number of accessions. The growth in the number of accessions over the past 3 contract years can be attributed to the following:

- (1) Especially during the first year on the new system, emphasis was divided between input of current accessions and correction of entries converted from BASIS. The BASIS System and the RDT&E System are very different in required format, thus requiring many BASIS fields to be reinput by keyed or on-line input rather than input from magnetic tape from Battelle's CDC computer to DDC's Univac computer. The index terms from these old BASIS records are still being modified using the CRT input system on an as-time-is-available basis since vocabulary control using the MCIC Thesaurus is not available on the RDT&E System. Time spent on modifying existing records has dropped continuously over the 3-year period.
- (2) Over the 3-year period, our learning curve in the use of the RDT&E System has leveled off. MCIC now has a team of highly skilled clerical persons capable of inputting MCIC records into the information base using the CRT on-line input system or key-punched cards.
- (3) The improvement in support equipment for the RDT&E System, especially during the summer of 1977, has led to greater input efficiency. The conversion from the Uniscope 100 to Uniscope 200 cuts the number of transmissions required to transfer a block of data due to the screen size increase on the Uniscope 200. The addition of the Univac tape

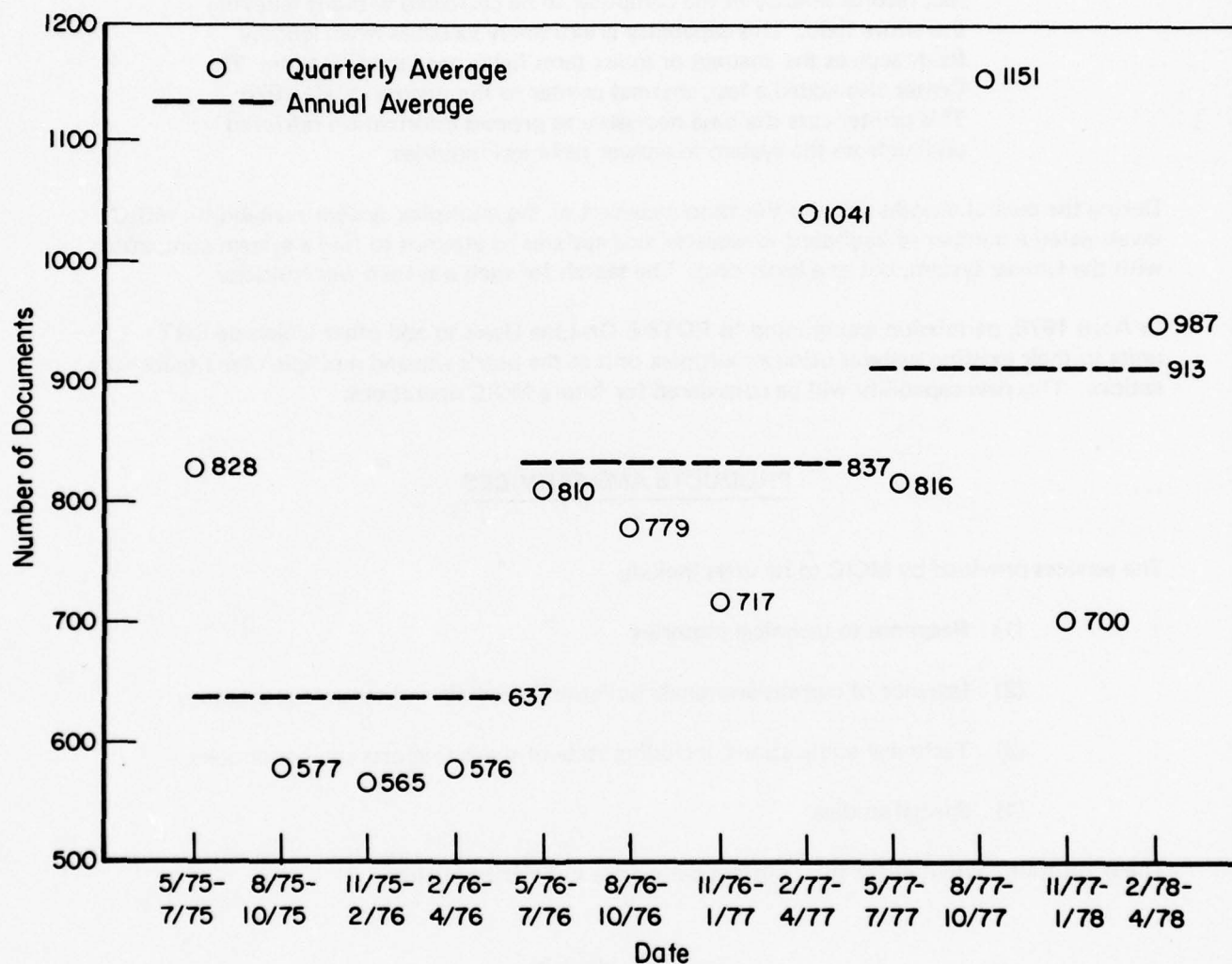


FIGURE 5. MCIC INPUT INTO RDT&E SYSTEM BY QUARTER
FROM MAY 1975 THROUGH APRIL 1978

cassette has permitted the Center to keystroke information during times before the computer is available each morning and during periods when the computer is down for repair. The cassette also permits incorrect records already in the computer to be corrected without rekeying the entire field. This capability is extremely valuable when lengthy fields such as the abstract or index term fields need modification. The Center also added a fast, thermal printer to the system in late 1976. This printer cuts the time necessary to process information retrieved on-line from the system to answer technical inquiries.

During the several months prior to the announcement of the multiplex system availability, MCIC investigated a number of keyboard to cassette tape systems to attempt to find a system compatible with the Univac system, but at a lesser cost. The search for such a system was fruitless.

In April 1978, permission was granted to RDT&E On-Line Users to add other Uniscope CRT units to their existing systems using a multiplex unit at the user's site and multiple user site identifications. This new capability will be considered for future MCIC operations.

PRODUCTS AND SERVICES

The services provided by MCIC to its users include

- (1) Response to technical inquiries
- (2) Issuance of current awareness bulletins on metals and ceramic technology
- (3) Technical publications, including state-of-the-art reports and handbooks
- (4) Special studies.

These "output" activities for this contract period are summarized below.

Technical Inquiries

The "real" benefit derived from any Technical Information Center is the capability of providing authoritative rapid-response answers to urgent technical requests. MCIC operates within the Battelle's Columbus Laboratories structure, and thereby is able to draw upon this source of capability to provide MCIC users with the advantages of technical expertise in metals, ceramics, and composites technology and of several materials data banks. Despite the difficulties that the user-charge concept (started in 1972) imposed on potential IAC users (Government and industrial, alike), MCIC, through a dedicated staff continues to meet its traditional technical inquiry commitment.

Statistics

During the period of this report, MCIC received 596 requests for technical assistance. Of these incoming requests, 468 were processed and 128 were cancelled. The effective processing rate was essentially 78.5 percent.

Of the assigned requests, 81 were subject to a user charge and 387 were answered without charge. Ordinarily, each of those inquiries that were answered without charge represented a minimal effort by an MCIC staff member, e.g., requiring less than an hour of effort. However, inquiries that had been cancelled often require MCIC managerial effort in addition to some technical effort in order to provide a cost estimate. A cancelled inquiry in MCIC's context includes those inquiries that have been priced (sometimes even processed) but not completed because final authorization to proceed was never received.

A total income to MCIC of \$21,773 is represented by the 81 user-charge inquiries. Charges ranged from \$10 to \$2350 per inquiry.

Statistics regarding the technical inquiries processed during the 24-month contract period are summarized in Table 2.

General Comments

As of May 1976, the MCIC scope of materials and processes was broadened to include all metals, ceramics, and composites of those materials of interest to the Department of Defense. Because of the broadened scope, MCIC had anticipated inquiries from a larger technical community. However, a larger inquiry rate did not occur but instead remained essentially constant, and the scope matrix remained unchanged.

Direct charging for inquiries continues to be a deterrent to inquiry services to both industrial and Government requestors. If charging is to continue, more realistic methods for paying for such services must be developed. A solution for Government agencies may be found through funds based on a percentage of materials contracts or a direct full-service subscription by specific agencies. Such approaches might be pursued by the Defense Logistics Agency (DLA) in conjunction with appropriate offices of DoD and the various DoD IAC's.

Current Awareness Bulletin

The "Current Awareness" function of MCIC serves to alert its users on a timely basis to significant technological developments. The present publication—entitled MCIC Current Awareness Bulletin (CAB)—evolved from both the MCIC Review of Metals Technology (and its predecessor, the DMIC Review of Recent Developments, 1962), and the MCIC Review of Ceramic Technology (and its predecessor, the DCIC Ceramic Awareness Bulletin, 1967). Unlike the Review series, CAB has been formatted so that highlights of current MCIC acquisitions on all MCIC-scope subjects (metals, ceramics,

TABLE 2. TECHNICAL-INQUIRY STATISTICS
MAY 1976 - APRIL 1978

Scope	Inquiries May 1976 - April 1977, % of total (230)	Inquires May 1977 - April 1978, % of total (238)	Composite Totals May 1976 - April 1978, % of total (468)
Requester:			
Industrial	76	75.6	75.9
Government (U.S.)	19	15.6	17.3
Foreign	3	6.3	4.7
Academic	2	2.5	2.1
Type of Response:			
Technical	83	79.4	81.2
Bibliographic	17	20.6	18.8
Materials:			
Metals	81	83.6	82.3
Ceramics	17	15.1	16.0
Composites	2	1.3	1.7
Technical Scope:			
Properties	40	51.7	45.9
Processing	26	23.1	24.6
Applications	10	11.8	10.9
Marketing	7	3.4	5.2
Foreign Alloy Equivalents	6	2.5	4.2
Specifications	3	3.4	3.2
Test Methods	4	0.8	2.4
Fundamental Behavior	3	1.7	2.4
Safety	0.5	1.2	0.8
U.S. Export Control	0.5	0.4	0.4

composites, processes, applications, markets, etc.) will appear in each issue. Also included is an MCIC News section featuring selected symposia schedules, calls for papers, new literature, R&D contract awards, and any other items of importance to the MCIC mission.

The MCIC CAB is published on a twice-a-month basis and is provided without charge only to U.S.-based users (currently 4850). Because of this "without-charge" feature, the MCIC CAB could very well become MCIC's most effective IAC service by reaching a maximum number of the DoD community. Issue Number 1 was published January 7, 1977, and has been issued twice a month since then.

Contributors to the technical sections of CAB are essentially those Battelle scientists and engineers who formerly acted as authors of the old Review series; most are well known in their respective fields of interest. Their chief function is to sift through the extensive MCIC accessions on a regular basis, select the material of greatest interest to the DoD community, and summarize the selections giving important data if appropriate to the summaries. Also, they often include information from their own accessions, their private files, and their attendance at symposia.

In general, the format of the MCIC CAB includes the following major subject headings:

METALS

- Light Metals
- Steels
- Stainless Steels
- Superalloys
- Refractory Metals
- Metals Fabrication
(Metalworking, Joining)
- New Testing Procedures

CERAMICS

- Structural
- Refractory
- Special Glasses
- Electronic
- Carbon-Graphite

COMPOSITES

- Metal Matrix
- Ceramic Matrix
- Carbon/Carbon

CORROSION/COMPATIBILITY

MCIC NEWS

- Meetings/Symposia
- Call for Papers
- Recent Reports & Books
- New R&D Contracts
- Bulletin Credits

Statistics

During the 24-month contract period, the following current-awareness periodicals were published:

	<u>Issues</u>
Review of Metals Technology	28
Review of Ceramics Technology	6
MPC/MCIC Review of the Low-Temperature Properties of Metals	5
Current Awareness Bulletin (CAB)	32

Because of joint MPC and MCIC sponsorship, the Review of Low-Temperature Properties was continued as a separate quarterly for the format of the discontinued Review of Metals Technology series.

In December 1976, when the Review of Metals Technology and the Review of Ceramic Technology series were terminated (at the request of DLA), the total number of subscriptions amounted to about 700 divided almost equally between the two. These Reviews of Technology were marketed by NTIS in the U.S. and some foreign countries and by MCIC in Japan.

MCIC net income from Review of Technology subscriptions (Metals, \$95 U.S. — \$120 non-U.S.; Ceramic, \$25 U.S. — \$32 non-U.S.) totaled \$2400 for the latter half of 1976. The quarterly Review of the Low-Temperature Properties of Metals is presently funded at the rate of \$5400 per year.

Survey of the Effectiveness of the Current Awareness Bulletin

In compliance with the contract, MCIC conducted a survey to determine the general effectiveness of CAB. A survey card, Figure 6, was prepared to query the MCIC user list, as well as to update the CAB distribution list. The survey cards were included in the CAB-25 issue (January 13, 1978) with a return requested by February 28. Special notices about the survey card were published in CAB Issue Numbers 24, 26, 27, and 28.

A total of 4850 cards were sent out and by April 30 2224 cards were returned—or 45.9 percent. To expedite the survey analysis, the first incoming 1613 cards were used to compile statistics—or 72.5 percent of the cards returned, more than necessary for a reasonable statistical population.

Survey Results. Responses to the first question regarding identification of the DDC User Number indicated that roughly half (52.3 percent) provided a number but not necessarily a correct number. This statistic shows that the DDC number method of controlling CAB distribution is poor, should be discontinued, and a simpler method should replace it.

Statistics obtained on those questions of the survey related to the CAB are based on the number of those who participated (i.e., those who did not leave blank the space provided for a response). A summary of these statistics is as follows:

IMPORTANT NOTICE

**THIS CARD MUST BE RETURNED TO MCIC IF
YOU WISH TO CONTINUE RECEIVING THE CAB**

The first issue of the Current Awareness Bulletin (CAB) was published by the Metals and Ceramics Information Center (MCIC) on January 7, 1977. Since then, this publication has been sent twice a month, free of charge, to all qualified users of MCIC courtesy of the Sponsor, the Department of Defense.

Now, in compliance with a request from the Sponsor of this service, we must determine (1) whether you wish to continue to receive the CAB and (2) the general effectiveness of the publication.

In order to update the MCIC Distribution List, MCIC will assume that you want your name deleted from the list if this postpaid card is not returned by February 28, 1978.

To help us evaluate the effectiveness of CAB, please answer the following questions as well as you can:

- What is your Defense Documentation Center (DDC) User Number? _____
(Your organization's library can help.)
- If you have, in the past, been a regular reader of the MCIC Reviews of Metals Technology and/or Reviews of Ceramics Technology (both discontinued December 1976), how do you rate the present CAB format with that of the old Review series?
 - ☐ CAB is Better ☐ CAB is As Good ☐ CAB is Worse
- Do you circulate your copy of CAB? ☐ Yes, or do you file it away? ☐ Yes, or discard it? ☐ Yes
☐ No ☐ No ☐ No
- How do you rate the relevance of the information contained in CAB to your professional needs?
Comments:
- How can CAB be improved to better suit your needs?
Comments:

My correct mailing address is as follows:

NAME:

ORGANIZATION:

ADDRESS:

FIGURE 6. CURRENT AWARENESS BULLETIN (CAB) SURVEY CARD

CAB Series Versus Review Series Format

41 percent CAB format better;
48 percent as good; and
5 percent Review format better.

CAB Usage

39 percent circulate, then file
39 percent circulate, then discard
17 percent read, then file (do not circulate)
5 percent read, then discard

Overall, 78 percent circulate; 56 percent file.

CAB Relevance to Professional Needs

49 percent, good
26 percent, very good
13 percent, partial
11 percent, excellent
1 percent, no relevance but content found interesting and want to continue receiving CAB.

CAB Improvements Comments—57 percent left this question blank or indicated "no comment". Of those participating (43 percent in this category), ten significant "comments groups" evolved (given as a percentage of the 43 percent participants).

- (1) OK as is (32 percent)
- (2) More Ceramics coverage requested (9 percent)
- (3) More Metalworking coverage requested (7 percent)
- (4) More Composites coverage requested (7 percent)
- (5) Annual subject index requested (5 percent)
- (6) Generally, more technical detail requested (4 percent)
- (7) Return to individual subjects—the old Review format (3 percent)
- (8) Include CAB contributors' phone numbers for further discussion of subject matter presented (2 percent)
- (9) More Corrosion coverage requested (2 percent)
- (10) More Superalloy coverage requested (2 percent).

If all requests for more technical detail of various subjects, including items (2), (3), (4), (6), (7), (8), (9), and (10) above, can be interpreted to mean that more technical detail overall is requested, then the above responses to CAB can be summarized as

- 32 percent, OK as is
- 50 percent, more technical detail requested
- 18 percent, miscellaneous (i.e., with the exception of (5) above, each sub-category represents less than 1.5 percent).

This breakout appears to be in conflict with the statistics obtained for the "CAB Series Versus Review Series Format" question. In fact, many participants who said that the CAB series is "as good as" the Review series then requested more technical detail for specific subject areas. One wonders if this group of participants are happy with the "combined-subject" format of CAB, but, nevertheless, do not want to lose the technical detail presented in the Review (subject) series, i.e., they prefer a 16 to 20-page twice-a-month technical periodical—free of charge, of course.

Conclusions of the Survey. The MCIC CAB Survey appears to have met its objectives.

The first objective of the Survey—to determine the general effectiveness of the MCIC CAB publications—appears to have been met overwhelmingly. Not one returned card indicated termination of the service because of content. Probably the statistics on "CAB Relevance to Professional Needs" show this best. Only 13 percent indicated *partial* relevance, and only 1 percent *no relevance* (but wanted to continue receiving it). An 86-percent relevance ratio is certainly outstanding, and the MCIC CAB represents a very real service to those interested in and working with DoD-oriented materials and processes.

The second objective—to update the distribution list—was met by showing that the distribution list is not self-purging through the use of return mail. Consequently, a survey of the CAB audience should be made annually. In the "CAB Usage" part of the Survey, over 75 percent of the CAB recipients circulate their copies. Therefore, if all CAB readers received a personal copy, the MCIC distribution list would at least triple in size.

In the future (under the new MCIC contract), an additional plan to update or purge the mailing list will be formulated and put into action.

Publications

MCIC technical publications include state-of-the-art reports, proceedings of current technical conferences, handbooks, critical reviews and technology assessments, and special task reports. Such publications are planned to provide significant information in a form which has historically proven most useful to DoD components, other U.S. government agencies and contractors. The choice of topics for publication, within MCIC's scope, continues to reflect the constraint of recovering costs. In order to maintain a reasonable price for reports to the DoD community, government agencies and their contractors, it has been necessary to broaden the potential interest group for the reports. Although

the user audience has expanded, the interests of the DoD, government agencies, and their contractors have always been the factor of paramount importance in all publication subject-selection decisions.

Technical Reports

Twelve formal MCIC reports were published during this contract period. Included were four state-of-the-art reports (MCIC 76-28, 77-30, 77-34 and 78-37), three bibliographic (MCIC 77-29, 77-31 and 77-32), three symposium or conference proceedings (MCIC 77-33, 78-35 and 78-36), and two special reports (DoD Structures Technology, 1976, and DoD Materials Technology, 1978). The status of publication of these reports, as well as those published in previous years, is reported in Table 3.

During the approximately 6 years that the MCIC sales program has been in existence, 15,102 copies of the 44 technical reports available have been sold, primarily by NTIS and MCIC, through April 1978. Approximately 7 percent of these were sold in FY 72, 17 percent in FY 73, 23 percent in FY 74, 32 percent during the contract period from August 1974 - April 1976, and 21 percent during this contract period April 1976 - April 1978.

MCIC revenue from the sale of reports during the current contract was \$37,536, which is a decrease of about 22 percent over the previous contract period. Cost recovery was 10 percent of the total cost to publish all the reports available. The cost recovery for all of the reports published and sold is about 36 percent, compared to 39 percent recovery of the total through the previous contract period. This reduction in percent recovery reflects the fact that 12 reports and two special reports were published during the last contract period, which involves a greater investment unrecovered. The recovery of total cost will always reflect the fact that the investment in reports during any given fiscal year will not be recovered until future years. This is shown by the report sales listed in Table 4. The reports published through June 1976 have sold 13,055 copies, while the 12 reports published (and available for sale) in the current contract period had only sold 1048 copies.

User Survey. In response to the contractual requirement to determine the effectiveness of MCIC's technical publications, a modified version of the DLA suggested form was prepared for mailing to recipients of selected technical reports and handbooks. A copy of the MCIC "Product Evaluation" form, a self-mailer, is shown in Figure 7.

The initial survey was directed to those identifiable customers who have copies of MCIC-HB-01, "Damage Tolerant Design Handbook", and its two supplements. The forms were mailed in September 1977 with return address to DLA. Results of responses received by DLA were not available for inclusion in this report.

Handbooks

The acceptance of various MCIC handbooks, databooks, and manuals by the DoD community and other users of MCIC products has been excellent, as indicated by the sales. Their publication was

TABLE 3. STATUS OF MCIC TECHNICAL REPORTS (APRIL 30, 1978)

Reports Published This Contract Period	Estimated Cost to Complete	Publication Date	Estimated Completion Date
Uses and Fabrication of Depleted Uranium, MCIC-76-28		Nov. 1976	
Proceedings of the Fourth AMMRC Materials Technology Conference, Advances in Joining Technology (Special task funded by AMMRC)		Jan. 1977	
An Annotated Bibliography on Silicon Nitride for Structural Applications, MCIC-77-29		Mar. 1977	
Dispersion Strengthening of Metals, MCIC-77-30		April 1977	
Bibliography on Low-Temperature Properties of Materials, MCIC-77-31		May 1977	
Bibliography on Effects of High Heating Rate on Properties of Materials, MCIC-77-32		June 1977	
Proceedings of the 1976 Tri-Service Corrosion Conference, MCIC-77-33		Dec. 1977	
Hot Isostatic Processing, MCIC-77-34		Nov. 1977	
Rheocasting Conference Report, MCIC-78-35		Jan. 1978	
Materials Technology Conference, 1978		Feb. 1978	
Proceedings of the Ceramic Turbine Conference, MCIC-78-36		Mar. 1978	
Corrosion of Metals in the Marine Environment, MCIC-78-37		Mar. 1978	

TABLE 3. (Continued)

	Estimated Cost to Complete	Publication Date	Estimated Completion Date
Reports in Process*			
Bibliography on Composite Materials	\$ 4,500	June 1978	June 1978
Microalloyed and Other High-Strength, Low-Alloy Steels	5,000	July 1978	June 1978
Proposed Reports*			
Surface Characterization of Materials	8,000		
Corrosion Fatigue in Marine Environments	20,000		

* To be continued under MCIC's new contract DLA-900-78-C-1715.

TABLE 4. SALES OF MCIC TECHNICAL REPORTS

Designation	Title	Date of Publication	No. of Copies Sold During Quarter			Accumulative Sales (No. of Copies)
			NTIS	MCIC (1)	Total	
DMIC 245(H&S)	The Corrosion of Metals in Marine Environments	May '70	14	82	101	912
MCIC-71-01	Effects of Surface Condition on the Mechanical Properties	Aug '71	25	34	59	918
MCIC-71-02	Shot Peening for Improved Fatigue Properties and Stress-Corrosion Resistance	Dec '71	51	35	86	1000
MCIC-72-03	Nontraditional Machining of Beryllium	Jan '72	7	2	9	220
MCIC-72-04	Crack Behavior in D6AC Steel	Jan '72	6	9	15	383
MCIC-72-05	Symposium on Electrodeposited Metals as Materials for Selected Applications	Jan '72	18	13	31	869
MCIC-72-06	Purity Effects in Beryllium	Mar '72	9	5	14	125
MCIC-72-07	Oxidation of Iron-, Nickel-, and Cobalt-Base Alloys	Jun '72	12	33	45	381
MCIC-72-08	Hot Corrosion in Gas Turbines	Jun '72	36	30	66	404
MCIC-72-07/08	(Combination of above reports)	Jun '72	10	0	10	184
MCIC-72-09	Bibliography on Fibers and Composite Materials	Jul '72	18	11	29	591
MCIC-72-10	Superalloys—Processing	Sep '72	21	37	58	524
MCIC-72-11	Beta Titanium Alloys	Sep '72	5	14	19	298
MCIC-72-12	Fracture Analysis by Scanning Electron Microscopy	Dec '72	57	136	192	1422
MCIC-73-13	Advances in Joining Technology	Jan '73	32	30	62	663
MCIC-73-14	Current and Future Materials Usage in Aircraft Gas-Turbine Engines	Jun '73	25	26	51	592
MCIC-73-15	Metallurgy of Fusion-Weld Repair	Aug '73	57	65	122	523
MCIC-73-16	Titanium Castings Today	Dec '73	23	36	59	243
MCIC-74-17	Proceedings of Structural Electrodeposits Symposium	Jun '74	50	28	78	376
MCIC-74-18	Metal Implants for Orthopedic and Dental Surgery	Feb '74	31	53	84	437
MCIC-73-19	Proceedings of the 1972 Tri-Service Corrosion Conference	Dec '73	35	11	46	346
MCIC-74-20	Properties of Textured Titanium Alloys	Jul '74	19	29	48	196
Special Report	Structures Technology Conference	Apr '74	0	21	21	349
MCIC-74-21	Ceramics for Prosthetic Applications	Jul '74	61	50	111	193
MCIC-74-22	Nondestructive Testing of Beryllium	Jul '74	12	12	24	67
MCIC-74-23	Corrosion of Metals in the Atmosphere	Aug '74	81	71	152	469
MCIC-74-24	Automation in Welding	Oct '74	33	28	61	209
MCIC-75-25	Cracks at Structural Holes	Mar '75	32	22	54	214
MCIC-75-26	The Titanium Industries in the Mid 1970's	Jun '75	19	57	76	283
MCIC-75-27	Proceedings of the 1974 Gas-Turbine Materials in the Marine Environments Conference	Jul '75	39	62	101	254
MCIC-76-28	Processing and Applications of Depleted Uranium Alloy Products	Nov '76	21	27	48	48
MCIC-77-29	An Annotated Bibliography on Silicon Nitride for Structural Applications	Mar '77	28	61	89	126
MCIC-77-30	Dispersion Strengthening of Metals	Apr '77	53	59	112	112
MCIC-77-31	Low Temperature Properties of Materials—A Bibliography	May '77	14	39	53	53
MCIC-77-32	The Effect of Rapid Heating on the Properties of Materials—A Bibliography	Jun '77	50	20	70	70
MCIC-77-33	Proceedings of the 1976 Tri-Service Conference on Corrosion	Dec '77	0	0	0	0
MCIC-77-34	Hot Isostatic Processing	Nov '77	0	110	110	110
MCIC-SR-75-01	Materials Shortage Workshop Proceedings	Feb '75	—	45	45	145
MCIC-SR-76-06	Workshop on Government Policies and Programs Affecting Materials Availability	Mar '76	—	205	205	284

TABLE 4. (Continued)

Designation	Title	Date of Publication	No. of Copies Sold During Quarter		Accumulative Sales (No. of Copies)
			NTIS	MCIC ⁽¹⁾	
Special Report	Structures Technology Conference, 1976	Nov '76	-	171	171
Special Document	AMMRC Books		-	144	144
MCIC-78-35	Rheocasting	Mar '78	-	1	1
MCIC-78-36	Proceedings of Ceramics for Gas Turbines Conference	Jan '78	0	200	200
MCIC-78-37	Corrosion of Metals in Marine Environments	Feb '78	-	-	-
Special Report	Materials Technology Conference 1978	Feb '78	0	0	0
TOTAL ⁽²⁾			1004	2139	3145
					15102

(1) Includes reports sold through ASM and the MCIC outlet in Japan, MRI, through April 30, 1978.

(2) The NTIS total is reported for the calendar quarter ending March 31, 1978, which the MCIC total is reported for the contract quarter ending April 30, 1978.

Please evaluate this publication of METALS AND CERAMICS INFORMATION CENTER:

MCIC-HB-01 DAMAGE TOLERANT DESIGN HANDBOOK plus 1st & 2nd SUPPLEMENTS

We would appreciate it if you would complete this questionnaire and return it to the Defense Logistics Agency. DLA administratively manages this information analysis center for the Department of Defense (DoD) which has the responsibility to insure that the Center is responsive to scientific and technical information needs of the defense community. Your candid evaluation and any other information will be used to effectively guide this Center in meeting your information needs, as well as assess the value of the Center to DoD.

1. Is the information (Check one or more as applicable):

- | | |
|---|--|
| <input type="checkbox"/> Relevant | <input type="checkbox"/> Easy to use |
| <input type="checkbox"/> Timely | <input type="checkbox"/> Do you expect to use it often |
| <input type="checkbox"/> Technically excellent | <input type="checkbox"/> Overall should be very useful to my job |
| <input type="checkbox"/> Technically satisfactory | <input type="checkbox"/> Other _____ |

2. Benefits you gained by using this publication:

- A. How often would you estimate that you consulted or will consult this publication? _____ times per,
☐ day ☐ week ☐ month ☐ year (check one)

(1) What amount of time do you estimate that it would take you to otherwise locate this information yourself?

(2) What do you estimate this time would cost you? _____

- B. Can you think of instances in which the information contained in this publication helped or could help to save/avoid costs on a project/task? (e.g., eliminated or shortened a test, substituted material or component)

☐ Yes ☐ No

(1) In how many projects/tasks do you estimate you will use this information:

- | | |
|------------------------------------|-------------------------------------|
| <input type="checkbox"/> 2 or less | <input type="checkbox"/> 5 to 10 |
| <input type="checkbox"/> 2 to 5 | <input type="checkbox"/> 10 or more |

(2) Estimated costs saved or avoided:

- | | |
|--|---|
| <input type="checkbox"/> Less than \$100 | <input type="checkbox"/> \$1000 to \$5000 |
| <input type="checkbox"/> \$100 to \$500 | <input type="checkbox"/> \$5000 to \$10,000 |
| <input type="checkbox"/> \$500 to \$1000 | <input type="checkbox"/> \$10,000 or more |

(If such savings relate to a system being developed or modified for the U.S. Government, please specify):

3. Intangible benefits (please describe):

4. What changes, if any, would you recommend in this publication?

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Shorter | <input type="checkbox"/> Illustrations |
| <input type="checkbox"/> More detail | <input type="checkbox"/> Printing |
| <input type="checkbox"/> Organization | <input type="checkbox"/> Other _____ |

Comments: _____

5. Name (optional) _____

Organization _____

Job Title _____

Field of Specification _____

continued in the current contract period and will be continued in the new contract period. All handbooks, databooks, and manuals published or in process by MCIC and their sales statistics are listed in Table 5.

The revenue from the sale of handbooks for this contract period was \$95,294, which is a recovery of approximately 16 percent of the total cost of production. The sale of handbooks since their first publication has recovered over 48 percent of the cost of preparation and publication. These books have shown a much better return on investment than have the technical reports for two reasons:

- (1) The cost of preparation of most of the MCIC handbooks published thus far has been partially or fully subsidized by an organization other than MCIC.
- (2) Handbooks have a much wider audience appeal than do many of the technical reports.

This valuable service to the MCIC users will be a continuing task. Continuation of the handbook series International Alloy Compositions and their equivalents in United States Alloys and the Ceramic Databook will be MCIC-supported activities. The possibility of updating the other existing handbooks with outside funding will also be pursued.

Films

Two MCIC films have been available for sale or rent during the present contract period. The first MCIC film was a companion to MCIC Report 72-12, entitled "Scanning Fractures with the Electron Microscope"; and the second film was a companion to MCIC Reports 74-18 and 74-21, "Ceramics and Metals in Medical Prosthetics". The total cumulative sales for the current contract period for these films are shown below. No new MCIC films are planned for the immediate future.

		Current Contract Period		Cumulative	
		Number	Income	Number	Income
MCIC-A	Scanning Fractures with the Electron Microscope				
	Rental	7	135.00	54	1325.00
	Sales	2	<u>250.00</u>	25	<u>3112.50</u>
			385.00		4437.50
MCIC-B	Ceramic and Metals in Medical Prosthesis				
	Rental	2	30.00	12	280.00
	Sales	1	<u>125.00</u>	2	<u>225.00</u>
			155.00		505.00

TABLE 5. STATISTICS ON MCIC HANDBOOKS

Designation	Title of Subject	Date of Publication	No. of Copies Sold During Quarter			Accumulative Sales	Estimated Cost to Complete, \$
			NTIS ⁽¹⁾	MCIC ⁽²⁾	Total		
MCIC-HB-01	Damage Tolerant Design Handbook	Dec '72	53	87	140	1165	
MCIC-HB-01S1	Supplement to the Damage Tolerant Design Handbook	Sep '72	41	63	104	687	
MCIC-HB-01S2	Supplement to the Damage Tolerant Design Handbook	Jan '75	32	141	173	567	
MCIC-HB-02	Titanium Alloys Handbook	Dec '72	47	71	118	928	
MCIC-HB-03	Forging Equipment Materials and Practices	Oct '73	177	57	234	1104	
MCIC-HB-04	Materials for Superconducting Machinery	Dec '74	17	87	104	323	
MCIC-HB-04S1	Supplement to Materials for Superconducting Machinery	Mar '76	50	134	184	187	
MCIC-HB-04S2	Supplement to Materials for Superconducting Machinery	Jan '77	26	95	121	131	
MCIC-HB-05	Handbook of Soviet Alloy Compositions	Feb '75	27	115	142	555	
MCIC-HB-05S1*	Supplement to Handbook of Soviet Alloy Compositions	Oct '76	34	104	138	138	
MCIC-HB-06	SEM/TEM Fractography Handbook	Jan '76	16	114	130	696	
MCIC-HB-07V1	Engineering Property Data on Selected Ceramics, Volume 1, Nitrides	Mar '76	115	197	312	320	
MCIC-HB-08	Electron Fractography Handbook	Jan '76	56	196	252	252	
MCIC-HB-08V1*	Handbook of International Alloy Compositions, Volume I, Titanium	Mar '77	20	207	227	227	
MCIC-HB-08V2*	Handbook of International Alloy Compositions, Volume II, Superalloys	Apr '78	-	-	-	-	4,000
MCIC-HB-07V2*	Engineering Property Data on Selected Ceramics, Volume II, Carbides	Jun '78	-	-	-	-	10,000
TOTAL			711	1668	2379	6776	

(1) The NTIS totals are reported for the calendar quarter ending March 31, 1978.

(2) MCIC sales include documents sold through ASM and the MCIC outlet in Japan, MRI, through April 30, 1978.

* Published during the current contract period May 1, 1976 - April 30, 1978.

No new films are planned for the immediate future, since the use rate of the two technical films has become rather insignificant. However, MCIC management plans to use these two films, as well as the "MCIC Operations" film, in a future campaign to promote visibility of the Center's products and services to the academic community, who could be future customers from the scientific and technical community.

General Comments. Two problem areas are apparent in the publications task of MCIC's operations. These include (1) reprinting of documents upon depletion of stock, and (2) storage of the publications stock. During this contract period, it was necessary to reprint two handbooks, HB-02 and HB-06, and HB-01--Supplement 1. In the past reprints were made for handbook HB-01 and two reports. Since reprinting is becoming a significant portion of the MCIC publications budget, the assignment of future sales income between reprinting of old documents or publication of new documents will be watched carefully.

A related problem is publications storage space, which is a significant factor in decisions on the number of documents that should be produced in an initial or follow-on printing. Warehousing for MCIC's various documents is becoming a critical problem because of limited space at Battelle and because NTIS has placed a limit on the number of each MCIC document that they will maintain in stock. Alternative solutions for this problem which will be considered in the future include

- (1) Rental of storage space outside of Battelle
- (2) Reprint limited amounts at frequent intervals
- (3) Pass on to NTIS the responsibility of maintaining a reliable source for MCIC documents after the initial printing is sold out.

The DoD IAC's degree of involvement in publications activity, i.e., promotion, marketing, and distribution, should have an appropriate relationship to its main technical mission. The large number and variety of publications produced since 1970, the activity for the transfer of such information to the user community, and the required income goal established by DoD is becoming a major part of MCIC operations. If this element of the operation continues to grow without appropriate increase in net sales income to accommodate the additional costs, such growth could impair the technical mission of the Center through a limitation of funds. Consequently, future operations of MCIC with respect to publications growth will be a major concern of the Center's management.

Special Studies

This category was inaugurated to cover tasks which can be described as "super" inquiries. Under separate funding by agencies of DoD through supplements to the basic MCIC contract, these tasks generally require a substantial amount of technical effort extending over a period of time. Each study can involve one or more phases which are assigned to various research staff within Battelle. These tasks are monitored by MCIC whose combination of information and data resources and professional skills in pertinent fields often make it possible to save both time and costs in completing each effort. Through such assignments, the government is able to capitalize further on the substantial investment it has made in the creation of the technical information services.

Table C presents a summary of the various special studies undertaken during this contract period.

All special tasks have been completed. It is anticipated that several of these tasks will be renewed on the succeeding MCIC contract. All studies were funded by other government agencies except "Metal Forming Data Bank" (MFDB), which appeared to have sufficient outside interest to proceed on MCIC funding. A summary of the results are presented in the following section.

Metal Forming Data Bank

The objective of the MFDB task was to determine requirements of a complete information system that could respond to a general or specialize potential user group.

In order to determine the main elements and structure of a Metal Forming Data Bank, two aspects were examined:

- (1) Handbook—In order to determine the prospective material which could be included in a Handbook, several existing reports were examined as possible elements of a Metal Forming Handbook:
 - Classification of Metal Forming Processes
 - Non-Lubricated Hot Extrusion
 - Billet Separation.
- (2) Computerized Data Center—The content, scope, and function of a computerized Metal Forming Data Center were examined. To be useful to the anticipated audience, the information in the system should contain—for any particular metal forming process:
 - Brief description of the process with its application
 - Flow and workability properties of a particular material applicable to a process
 - Practices and processing data for forming different materials in a specific process
 - Manufacturing limits, tolerances, properties, and manufacturers of a formed product
 - Sources of equipment and tooling
 - Simple design programs for designing the process and the tooling and selecting equipment
 - Literature references for further information.

TABLE 6. SUMMARY OF SPECIAL STUDIES DURING THIS CONTRACT PERIOD

Title or Description	Funding Level	Sponsoring Agency	Period of Performance
Metal Forming Data Bank	\$22,000*	MCIC	Jul 1, 1976 - Apr 30, 1978
Technical Assistance in Establishment of Army Manufacturing Technology Management Information System (MTMIS)	70,000 32,000	AMMRC	Sep 20, 1976 - Jun 30, 1978
Update and Supplement to Previous Review of HY-130 Steel Weldment System	16,000 28,203 5,137	Navy Sea Systems Command	Sep 20, 1976 - Apr 30, 1978
Conduction of DoD Structure Technology Conference	22,000	OUSDR&E/DoD	Sep 20, 1976 - Nov 30, 1976
Preparation of Technical Journal for Army Manufacturing Technology Program	50,000 15,000 10,000 22,455	AMMRC	Sep 16, 1976 - Mar 31, 1978
Technical Advisory Assistance to AMMRC and ODDRE (now, OUSDRE)	10,000 5,000 12,480 16,900	OUSDR&E and AMMRC	Sep 16, 1976 - Jun 30, 1978
Laser Effects Data Bank	29,845	AMMRC	Nov 17, 1976 - Jul 31, 1977
Preparation of Materials Technology Coordinating Paper and Conduct of Materials Technology Conference	94,098	DARPA	May 3, 1977 - Feb 28, 1978
Ceramics for High-Performance Applications—Coordinate Conference and Publish Proceedings	34,145	AMMRC	May 9, 1977 - Dec 31, 1977

TABLE 6. (Continued)

Title or Description	Funding Level	Sponsoring Agency	Period of Performance
Publish Proceedings of Joining Conference	\$22,788	AMMRC	May 9, 1977 - Feb 28, 1978
Study Comparison of International Standards	18,934	AMMRC	May 9, 1977 - Feb 28, 1978
Review of Subcritical Cracking in Hull Candidate Steel Weldments	59,664	David Taylor Naval Ship Research and Development Center (DTNSRDC)	May 9, 1977 - Jun 30, 1978
Survey and Analysis of the Literature on Mechanical Properties of Structural Alloys and Ceramics on Rapid Heating	20,000	Tri-Service OUSDR&E/DoD	May 1, 1977 - Feb 28, 1978
Evaluation and Planning of Materials R&D for Naval Ships	67,370	DTNSRDC	May 1, 1977 - Jun 30, 1978
Evaluation of Forging Problem on Rotor Blade Edges	3,000	U.S. Army AVRADCOM	Sep 26, 1977 - Oct 31, 1977
Publication of the Proceedings of the 1976 Tri-Service Conference on Corrosion	6,000	Naval Air Development Center	Sep 1, 1977 - Nov 30, 1977
Literature Survey Related to Use of Non-Ferrous Materials in Ship Structures	16,000	DTNSRDC	Dec 15, 1977 - Apr 30, 1978
Manufacturing Technology Plan	10,000	Naval Air Engineering Center	Mar 23, 1978 - May 31, 1978

* MCIC funding not included in supplemental income from Special Studies/Tasks.

In order to assess the problems and procedures necessary to set up such a system, a "mini" MFDC for hot extrusion of titanium and aluminum was developed. Because of the limited scope of this study, only readily available data was used to demonstrate the MFDC concept.

Using Battelle's Automated Search and Information System (BASIS) to store and retrieve data, an hierarchical search procedure is employed. By starting with the selection of a metal forming process, the user can then interactively step through the material and data he requires until all aspects of the process have been defined.

The results of this task are now being reviewed to determine whether it should be pursued in more depth (completing a Handbook and setting up a MFDC).

Marketing and Promotion

An increasingly important part of the MCIC program is its marketing and promotional activities which provide mechanisms for the transfer of technical information to the agencies of the Department of Defense and its supporting industrial and academic community.

MCIC's marketing efforts in the domestic and international areas were supplemented by three other organizations under agreements with MCIC. These include

- (1) National Technical Information Service (NTIS)
- (2) American Society for Metals (ASM)
- (3) Mitsubishi Research Institute/Neutrino Inc. (Japan).

Negotiations are under way with Allied Publishers Private Ltd., India, to market MCIC products in that country.

A comparison of net income from NTIS and MCIC sales program, which includes ASM and MRI (Japan), is illustrated in Figure 8 for the period of 1974-78. Although MCIC sales have fluctuated in certain periods, the volume continues to be three to four times greater than NTIS. This overall decline in NTIS sales and the success of the MCIC program, which is more dramatically depicted in Figure 9, suggests that an aggressive promotional effort must be maintained by MCIC since the marketing services of NTIS do not appear to be as effective as expected.

Details on the marketing activities of MCIC and its supporting marketing organizations are described in the following sections.

MCIC

MCIC marketing and promotional efforts are designed to complement the NTIS program rather than compete with it. The MCIC program consisted of three facets: Announcements in MCIC's monthly

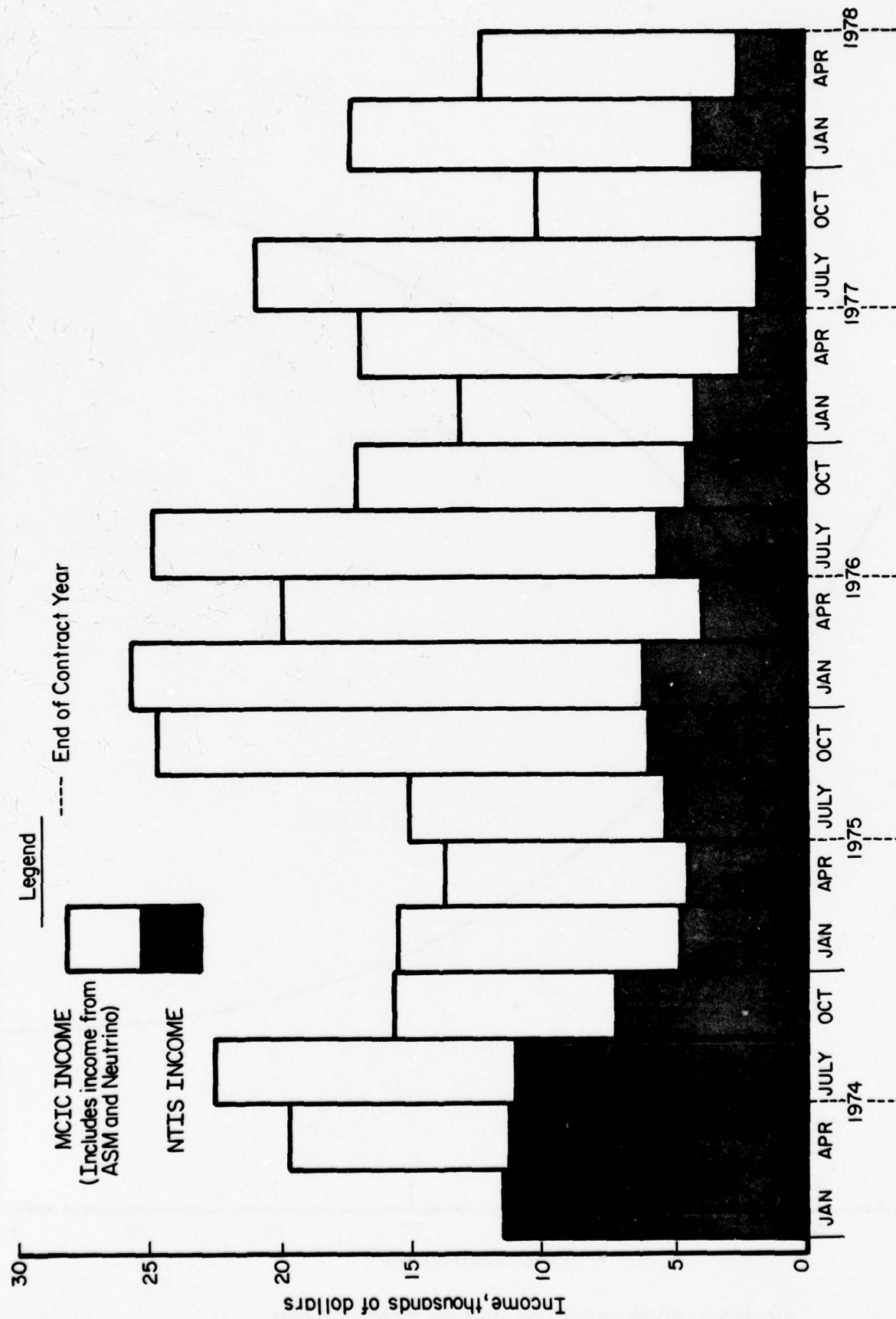


FIGURE 8. TOTAL INCOME TO MCIC FROM REPORTS, HANDBOOKS, AND FILMS BY QUARTERS ENDING AT THE INDICATED DATES

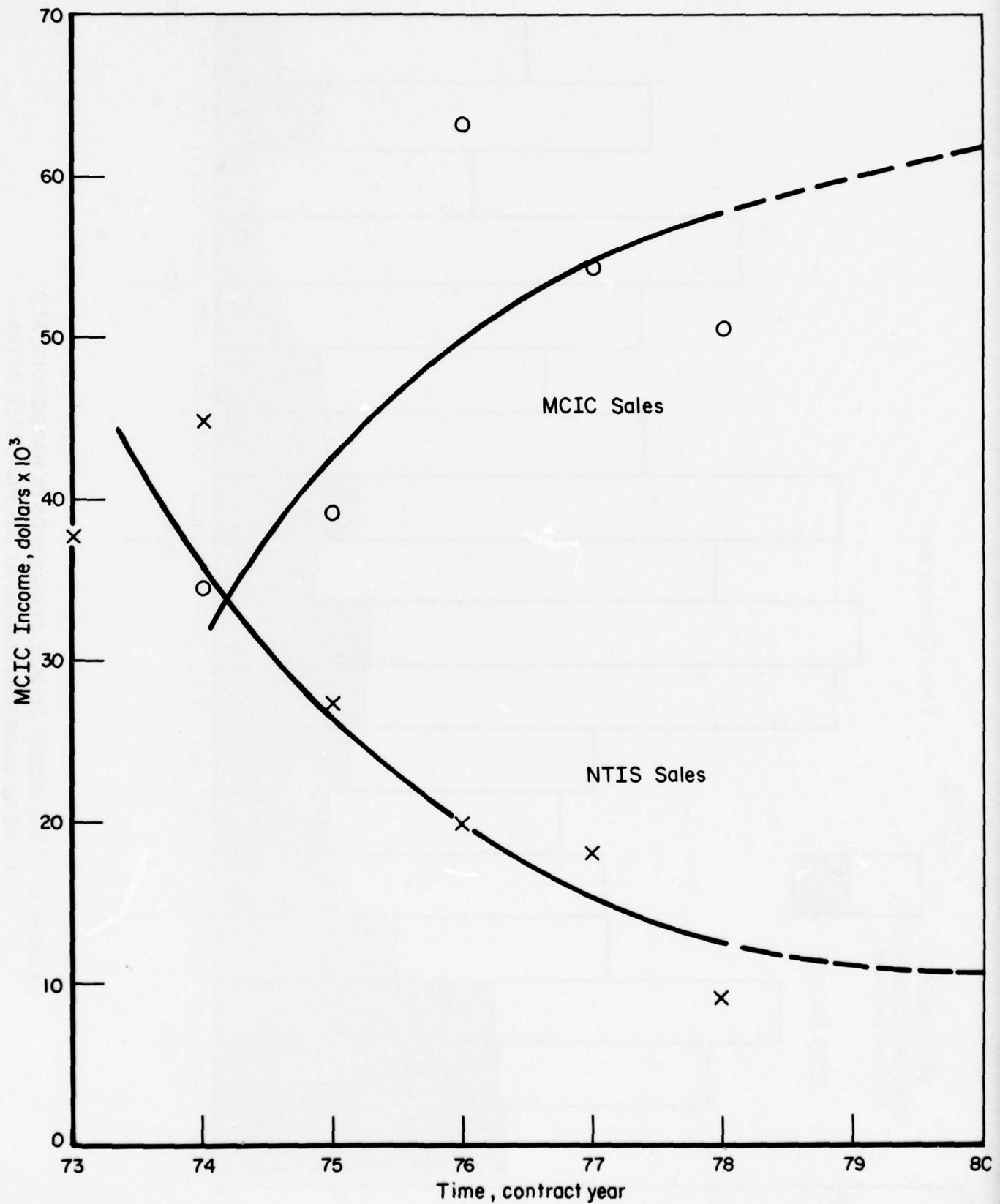


FIGURE 9. COMPARISON OF INCOME TO MCIC FROM
NTIS AND MCIC SALES OF REPORTS
AND HANDBOOKS

Newsletter, individual mailings describing specific products, and insertion of descriptive literature with the new MCIC Current Awareness Bulletin.

During this contract period, eight Newsletters were mailed to the MCIC mailing list which contained about 5100 addresses. Latest MCIC products were announced in the Newsletter, previous publications were listed, meetings of interest were reported, and most issues included a feature article concerned with items of interest to the reader audience. Some of the feature articles in the Newsletter are summarized in Table 7. Although the Newsletter was discontinued in December 1976, inserts in the new MCIC Current Awareness Bulletin continue to assist in our marketing and promotion program.

Direct mailings of flyers also were made to selected mailing lists to promote various MCIC products. These mailings are intended to be a "rifle-shot" type of promotional approach, as compared to NTIS efforts which address a very broad audience. Other promotional activities included announcements in journals and attendance at conferences where the DoD Information Analysis Centers were promoted. Promotion at the conferences included a display booth, displays of products, and descriptive handouts. Representatives of the IAC's manned the booth to furnish information and answer questions. The promotional efforts of MCIC during the last contract period are summarized in Table 8.

The film on MCIC's operations, products, and services was updated to reflect changes in operations and products which have occurred in the contract period. Although this 16-mm sound movie has been shortened from 12 to 9 minutes, the scope of MCIC's mission has been enhanced. This promotional media is employed in-house to acquaint visitors with MCIC and is loaned without charge to outside requestors.

Also, MCIC's brochure was revised in this contract period. The new brochure contains updated descriptions of the Center's operations, products, service charges, and has a pocket for insertion of descriptive information on specific reports and/or handbooks which are available from the Center.

During this report period, MCIC sold 1682 books and reports, and 1514 handbooks for a net income to MCIC of \$82,824.

ASM

MCIC has had a continuing agreement with the American Society for Metals since 1974 for the promotion and marketing of selected MCIC reports. In this assignment ASM has responsibility to market MCIC reports through its regular advertising programs and MCIC is responsible for order processing. During this contract period, ASM sold 40 handbooks and 267 reports for a total net income to MCIC of \$2472.

MRI (Japan)

An agreement between the Mitsubishi Research Institute (MRI) and MCIC was signed in April 1974 and renewed on January 24, 1977. Although MRI has direct responsibility for the promotion of MCIC

TABLE 7. A SUMMARY OF MCIC NEWSLETTERS FOR 1976

Newsletter Date	Feature Article Title or Layout
May 1976	Announced the Publication and availability of the proceedings of the 3rd Army Materials Technology Conference, "Physical Metallurgy of Uranium Alloys".
June 1976	The new ERDA Newsletter which is titled "Materials and Components in Fossil Energy Applications" was announced. The ERDA Newsletter, which is free, discusses materials of interest to the DoD technical community and other MCIC newsletter readers.
July 1976	The failure of materials and components in coal conversion systems and a new failure analysis reporting system administered by the National Bureau of Standards was featured.
August 1976	Announced the availability of the "Electron Fractography Handbook", HB-08, and the "Errata Sheets for the Second Supplement to Damage Tolerant Design Handbook".
September 1976	Featured an article on "The Use of Energy in the Primary Metals Industry". Also highlighted was the "National Science and Technology Policy, Organization, and Priorities Act of 1976", which deals with scientific research and information handling.
October 1976	Featured the services available from MCIC with emphasis on the performance of "Special Tasks".
November 1976	Announced the publication of the First Supplement to the Handbook of Soviet Alloy Compositions and the new bi-weekly Current Awareness Bulletin, which is designed to replace the Newsletter and the Reviews.
December 1976	Announced the "Handbook of International Alloy Compositions and Designations, Volume I-Titanium". Also highlighted was the new report "Processing and Applications of Depleted Uranium Alloy Products". This was the last issue of the Newsletter.

TABLE 8. PROMOTIONAL EFFORTS ON MCIC PUBLICATIONS

	Subject Area	Type of Promotion	Publication or Location
HB-09 Vol 1	Int'l Alloys Handbook—Vol 1, Titanium Alloys	Insert	MCIC Current Awareness Bulletin (CAB)
77-29	Bibliography on Silicon Nitride plus Information on Superalloys Int'l Alloys Handbook	Insert	MCIC, CAB dated May 20, 1977
HB-06	SEM/TEM Fractography Handbook	Display	Displayed for sale at the 10th Annual Meeting of the International Metallographic Society in Houston, Texas, July 19-20, 1977
HB-08	Electron Fractography Handbook	"	"
72-12	Fracture Analysis with SEM	"	"
74-18	Metal Implants for Surgery	"	"
74-21	Ceramic Implants for Surgery	"	"
74-23	Corrosion in the Atmosphere	"	"
74-245R	Corrosion in Marine Environment	"	"
MCIC	Announcement of Availability of MCIC as an Information Analysis Center	Announcement	ASLIB, Volume 5, Number 3, March 1977
HB-06	SEM/TEM Fractography Handbook	Publication Review	Microscopica Acta, Volume 79, May 1977
HB-08	Electron Fractography Handbook	"	"
HB-09, Vol 1	Int'l Alloys Handbook—Vol 1, Titanium Alloys	Publication Review and Announcement	American Metal Market, June 6, 1977
HB-09, Vol 1	Int'l Alloys Handbook—Vol 1, Titanium Alloys	Publication Announcement	Metal Progress, July 1977
77-29	Bibliography on Silicon Nitride	Publication Announcement	Ceramic Abstracts, May-June 1977

TABLE 8. (Continued)

	Subject Area	Type of Promotion	Publication or Location
77-30	Dispersion Strengthening of Metals	Insert	MCIC, Current Awareness Bulletin No. 28 (CAB) Feb. 22, 1978
77-31	Low-Temperature Properties—Bibliography	Insert	MCIC, CAB No. 29 dated Mar. 17, 1978
77-32	The Effect of Rapid Heating on Properties of Materials	Insert	MCIC, CAB No. 30 dated Mar. 30, 1978
77-34	Hot Isostatic Processing	Insert	MCIC, CAB No. 31 dated April 12, 1978
77-33	Tri-Service Conference on Corrosion, 1976	Insert	MCIC, CAB No. 32 dated April 28, 1978
77-35	Rheocasting	Insert	MCIC, CAB No. 32 dated April 28, 1978
HB-09 Vol 1	Handbook of International Alloy Compositions and Designations, Volume 1, Titanium	Book Review	Prepared by Engineering Societies Library for inclusion in 12 journals, dated January, 1978
HB-06 and HB-08	MCIC's Fractography Handbooks	Advertisement	Advertisers Brochure for SEM Symposium/3000 attendees
	Flyer on "Advances in Joining Technology"	Insert	Current Awareness Bulletin/5100
Special Report	Flyer on "DoD Structures Technology Conference Proceedings"	Insert	Current Awareness Bulletin/5100
HB-04S2	Flyer on "Handbook on Materials for Superconducting Machinery—Supplement 2"	Insert	Current Awareness Bulletin/5100
	Description of MCIC	Announcement	"Materials and Resources", Federation of Materials Societies
	Description of MCIC	Announcement	"Notes and Comments" Engineering Index

TABLE 8. (Continued)

	Subject Area	Type of Promotion	Publication or Location
HB-09V1	Description of "Handbook of International Alloy Compositions and Designations—Vol. 1, Titanium"	Announcement	"Metals Progress", Journal of the American Society for Metals
HB-06 and HB-08	Description of "SEM/TEM Fractography Handbook" and the "Electron Fractography Handbook"	Announcement	Materials Engineering Magazine
HB-06 and HB-08	Description of "SEM/TEM Fractography Handbook" and the "Electron Fractography Handbook"	Announcement	"Het Ingenieursblad, Ingenieurshuis, Jan van Rijswincklaan," Antwerp, Belgium
	MCIC Operations and Products	Display	Participated in the DoD Information Analysis Center's (IAC) display booth at the Triple Engineering Show on October 25-27, 1977, at McCormick Place, Chicago, Illinois
	MCIC Operations and Products	Display	Participated in the DoD IAC display booth at the DoD Materials Technology Conference on February 21-24, 1978, at the Institute for Defense Analysis in Washington, D.C.

products and services in Japan and other Asiatic countries, marketing of publications has been assigned to Neutrino, Inc., a reputable seller of technical documents for Japan (Neutrino also represents several other DoD/IACs.). Neutrino has continued its aggressive advertising campaign, including distribution of a special newsletter. Results to date have been very encouraging. During the current contract period, Neutrino sold 490 handbooks and 64 reports for an income to MCIC of \$19,666.

NTIS

The National Technical Information Service has been a marketing agent for MCIC products since 1970 and has maintained a continuous promotional program through their developed media. The routine information sources for MCIC products includes

- (1) Group Catalog on Special Technology (annual)
- (2) Abstract Newsletter (weekly), formerly the Weekly Government Abstracts
- (3) Government Reports Announcements/Index (weekly).

The catalog is dedicated to the promotion of products from selected information centers sponsored by the government. The Newsletter contains information that MCIC prepares for possible insertion on *space-available basis and promotion of an MCIC report if it fits a subject area of the Newsletter.* The GRA provides an official announcement of the availability of all reports generated on a government-sponsored program, such as MCIC.

Although NTIS has a very large, well-developed international marketing program for U.S. government reports, their sales volume for MCIC documents is significantly less than that achieved by the Center. During this contract period, NTIS sold 808 handbooks and 999 technical reports for a net income to MCIC of \$30,632. This amount is about one third of that achieved by MCIC.

Service-Charge Program

Charges for information services have been made by MCIC since January 1972 in accordance with DoD policy. The objectives of the service-charge program are to recover part, or all, of the costs associated with the output of the Center. The income is intended to offset rising costs and to provide for expansion of services to the technical community.

The current contractual statement of work for MCIC states that the goal for the service-charge program is an achievement of an average income equal to at least 75 percent of the basic contract funding (\$1,492,835); of this goal, 50 percent is related to direct income and 25 percent from indirect income. These categories of income are defined as

Direct Income—Obtained from (a) the sale of publications and services which is returned directly to the contract, and (b) studies funded as supplements to the MCIC contract.

Indirect Income—Which constitutes separately contracted studies for both government and industrial sponsors; costs of services provided to other sponsored programs in-house, as well as credits for the cost of technical inquiry services processed for nonpaying government agencies and for the costs incurred in processing inquiries which are cancelled after an estimate is made to the requester by MCIC.

MCIC's direct income is achieved through its publications (technical reports, handbooks, and films), its technical and bibliographic inquiry service, and special studies on tasks which are consigned by various federal agencies to the MCIC program via Military Interagency Purchase Requisition (MIPR). Additional funds are obtained from various technical services requested under other contract programs. Also, operational costs for certain free services provided by MCIC are included as creditable income. The direct income is the result of domestic and international marketing of products and services, not only by MCIC, but by the National Technical Information Service (NTIS), the American Society for Metals (ASM), and the Mitsubishi Research Institute/Neutrino, Inc. (Japan).

Each of the external marketing organizations contributes to the MCIC service-charge program. MCIC has a specific marketing agreement with each organization who, in turn, have marketing and accounting responsibilities for MCIC products and services which are provided at a specific or schedule of discount(s). In general, payments by the external organizations to MCIC have been satisfactory and within normal business practice.

The income achieved for this 2-year contract period is presented in Table 9. Total income was \$1,129,486 and represents 75.6 percent of the basic funding (\$1,492,835) for the FY 77-78 contract period (24 months). More specifically, the amount of direct income (\$944,161) and the amount of indirect income, including creditable income (\$185,325), represent a cost recovery of 63.2 and 12.4 percent, respectively.

Marketing activities related to MCIC publications and inquiry services were responsible for 13.2 percent of the total income; special studies (tasks conducted under the MCIC contract) provided 70.4 percent of the total income; other contracted activities produced 14.7 percent of the total income; the balance of 1.7 percent represents creditable income.

In general, the overall income (75.6 percent) achieved in this contract period is essentially the contractual goal (75 percent) for the service-charge program. Although the direct income (63.2 percent) exceeded the contractual goal (50 percent), the income achieved from indirect sources (12.4 percent) was below the contractual goal (25 percent).

FUTURE PLANNING FOR MCIC

The continued operation of MCIC as a full-service information analysis center is based on use of procedures that have been developed, refined, and tested at Battelle over many years of effective service to the Department of Defense and its technical community. The successful performance in the past demonstrates the capability of the management and operational staff to maintain cost-effective and

TABLE 9. MCIC INCOME SUMMARY, FY 77-78

Product/Service	Income, \$		
	MCIC	NTIS	Total
Direct Income ^{(a)*}			
Publications			132,640
Reports, Handbooks, Films	102,534	27,700	
Technical Reviews	732	1,674	
Inquiry Services ^(b)	2,652	13,991	16,643
Special Studies/Tasks ^(c)	751,019	--	751,019
ManTech Journal Subscriptions ^(d)	7,305	--	7,305
Army Conference Books ^(e)	2,730	--	2,730
Technical Meetings ^(f) II	33,824	--	33,824
	900,796	43,365	944,161
Indirect Income ^(g)			
Technical Inquiry Assistance Contracts			
AFML	2,292	--	
AMMRC	410	--	
Aerospace Corporation	506	--	
In-House Inquiry Service	3,877	--	
Low-Temperature Properties Review (Metals Properties Council)	9,400	--	
Inventory and Analysis of Materials Life Cycle (COMAT)	150,000	--	
	166,485	--	166,485
Creditable Income ^(h)			
Technical services provided to other government-sponsored in-house programs (1185)	5,940	--	
Technical inquiry services for nonpay- ing government agencies (66)	3,300	--	
Technical inquiries cancelled after MCIC estimate of costs (128)	9,600	--	
	18,840	--	18,840
			1,129,486

* See footnotes listed on following page.

TABLE 9. (Continued)

Footnotes

- (a) Funds received by the contract from sales of documents, services and special studies/tasks.
- (b) Billing for MCIC services handled by both MCIC and NTIS.
- (c) Supplemental (MIPR) funds to MCIC Contract DSA900-76-C-2471; details given in Table 6.
- (d) Subscription fees.
- (e) Royalties from Brookhill Publishing Company.
- (f) Three meetings: Army Ceramic Conference, March 1977 (\$18,282); Structures Technology Conference, November 1976 (\$4317); Materials Technology Conference, February 1978 (\$11,225).
- (g) Income from activities conducted by MCIC and Battelle personnel under other contracts.
- (h) Creditable income associated with MCIC services which were provided without charge.

and timely implementation of plans and procedures, to identify user requirements, and to respond to user needs through pertinent products and services.

Four primary challenges are envisioned in future operation of the Center. These include

- Keeping the data base and information system current and useful
- Identifying the specific products and services needed by MCIC users in the dynamic research, development, and design environment
- Publicizing MCIC capabilities and marketing its products and services
- Operating effectively despite increasing costs and achieving the required annual income goal.

DATA BASE AND INFORMATION CONTROL

Two areas of improvement are planned for information handling. The first is an upgrading of information input procedure into the MCIC data base at DDC. The second plan concerns a clean-up of the index vocabulary of the MCIC data base.

MCIC hopes to add a second Uniscope 200 and a multiplex unit to its present system to optimize the inputting operation into the data base by terminating the use of key-punch cards as an auxiliary input system. Time and cost savings are expected to be realized by this conversion. Approvals by DDC are pending.

Both DDC and MCIC hope to eventually make the MCIC data base available to all users of DDC's RDT&E On-Line System. The transfer in 1974-75 of MCIC's thesaurus-controlled data base from the Battelle BASIS System to the uncontrolled vocabulary of the RDT&E System created problems for information retrieval because of extraneous terms in the Battelle system. A nominal effort has been made since 1976 to clean up MCIC's index vocabulary in the DDC System. MCIC has as its continuing goal to reduce the word frequency list of terms. This will be accomplished by reprocessing the index fields of current records to eliminate misspellings and synonymous terms. MCIC hopes to have once again a thesaurus-controlled vocabulary which, when completed, should coincide with the planned reprogramming of the RDT&E On-Line System by DDC in 2 to 3 years.

PRODUCTS AND SERVICES

Timely publication of technical information and data related to material applications in defense systems and hardware will be the primary objective in the continuing MCIC program. The various categories of products and services which have been well received in the past by MCIC's user audience will be continued. These include Current Awareness Bulletin, Handbooks and Databooks, State-of-the-Art

Reports, Critical Reviews and Technology Assessments, Responses to Inquiries, and Special Studies/Tasks. The specific subject areas for these products and services will be based on identified and established needs of MCIC's user community.

Two additions to MCIC's products and services will be examined for future operations. It is planned to examine the resurrection of the former Reviews of Metal and Ceramic Technology, wherein information from limited distribution and up to Confidential classification would be included in these current awareness periodicals tailored to needs of specific government agencies or industrial organizations. The second new activity concerns the promotion of technical conferences to assist the information transfer for the DoD community.

PROMOTION AND MARKETING

High visibility of MCIC as a storehouse of specialized technical information and assistance is vital to the mission and future of the Center. Consequently, additional emphasis on promotion of the Center's capabilities and marketing of its products and services will be an expanded activity in MCIC's future operations. Promotion through direct contacts by both MCIC and Battelle staff with government and industry will be pursued within available funds. Marketing of MCIC products in both the domestic and foreign arenas will be continued. MCIC's marketing activity will be expanded through the development of several mailing lists directed to very specific audiences. More attention will be directed to the academic community from which MCIC's future technical audience will evolve.

Greater use of NTIS and its recently developed worldwide marketing network are envisioned for sales improvement in the foreign arena. Because the cost of mailing to foreign locations imposes a significant problem now that MCIC is responsible for such charges, the use of the NTIS overseas marketing system will facilitate MCIC's distribution operations, as well as make ordering and payments easier for the foreign requester within a country.

OPERATIONS MANAGEMENT

MCIC anticipates that inflation and mailing costs will have a significant effect on future operations. If program funding does not provide some compensation for these factors, then an operational adjustment may be necessary in the MCIC program. Although adjustments can be made in program activities and operational staff, no changes are contemplated by MCIC management at this point in time. Additional funds will be sought initially from expansion in sales of products and services, particularly in the area of special studies/tasks. Consequently, management intends to increase efforts in promoting such studies/tasks within the DoD and other federal agencies.

APPENDIX A

R&D CONTRACT STATUS REPORT

APPENDIX A

R&D CONTRACT STATUS REPORT

Table A-1 gives an update of the statistical summary of the operational activities of MCIC reported previously in the Eighth Quarterly Report for the period ending April 30, 1978. This supplemental report includes additional staff time, costs, and income which were accrued under an approved time extension through June 1978 for work conducted on several Special Studies/Tasks.

Because the format of this table is to be used by various DoD Information Analysis Centers to keep management (DLA and AMMRC) informed on contract activities and progress toward established program objectives, an explanation about MCIC's reporting of man-hours expended and costs incurred is needed since the basis of such data may be different for the various IAC's.

The accounting system of Battelle's Columbus Laboratories is utilized routinely to facilitate record keeping for MCIC operations. Consequently, the professional man-hours and direct costs given in Table A-1 do not correspond exactly with the DLA definition of such categories as given in the contract. The professional staff, according to Battelle classification, includes personnel who may or may not have a college degree or even a science or engineering-related degree but have accumulated experience for professional status at Battelle. To separate out the man-hours incurred for personnel who fit the professional category as specified in the contract would create another administrative task and cost. Unless such a breakout is imperative for program management, subsequent reporting or staff time incurred will be made according to the Battelle accounting system.

The direct costs given in Table A-1 include: (1) the cost of staff time that was directly related to MCIC operations, and (2) service charges for information input and storage to the Battelle computer facility. All material costs are included in direct costs.

FOOTNOTES FOR TABLE A-1

- (a) See explanation in text of Appendix A.
- (b) Actual income credits from NTIS, sales revenue by MCIC, and supplemental appropriations to MCIC contract, see "Income" section.
- (c) Cost and income included with technical inquiries.
- (d) Special Studies/Tasks appropriations and income related to products of some special tasks.

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT		NAME OF INFORMATION ANALYSIS CENTER MCIC				QUARTER ENDING	CUMULATIVE THRU June 30, 1978	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED			COSTS INCURRED			INCOME (b)
		PRO- FESSIONAL	NON-PRO- FESSIONAL	TOTAL	DIRECT	INDIRECT (a)	TOTAL (a)	
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		8,111	14,916	23,027	186,900	244,299	431,199	
a. DOCUMENTS ACQUIRED	8,169							
b. DOCUMENTS REVIEWED	8,022							
c. DOCUMENTS CATALOGED	7,011							
2. TECHNICAL INQUIRY RESPONSES PROVIDED	512	2,520	1,858	4,378	51,091	57,457	108,548	20,520
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	40	--	--	--	--	--	(c)	(c)
4. HANDBOOKS/DATA BOOKS COMPLETED		4,465	2,622	7,087	75,792	153,689	229,481	93,911
a. NEW CHAPTERS/PAGES COMPLETED	67/1641							
b. REVISED CHAPTERS/PAGES COMPLETED	19/2206							
c. DATA SETS COMPILED	32/710							
5. STATE-OF-THE-ART STUDIES COMPLETED	11	3,103	2,131	5,234	52,938	114,849	167,878	36,323
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED CAB & Tech. Reviews	66	4,804	2,629	7,433	95,181	158,068	253,249	2,406
7. CURRENT AWARENESS AND PROMOTION EFFORTS		541	3,939	4,480	26,515	45,880	72,395	--
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	37							
b. NUMBER MEETINGS, CONFERENCES, ETC SUPPORTED	58							
8. OTHER Special Studies/Tasks	17	12,117	6,406	18,523	202,233	561,320	763,553	795,378(d)
9. MANAGEMENT AND SUPPORT		4,252	5,005	19,257	117,371	143,707	261,078	
10. UNASSIGNABLE INDIRECT COSTS		--	--	--	--	--	--	
11. TOTAL		391,913	39,453	79,419	808,021	1,479,269	2,287,290	948,038

TABLE A-1. CUMULATIVE COSTS

EDITION OF JUN 72 IS OBSOLETE

DISTRIBUTION LIST

Mr. Samuel Valencia
COTR (2)
Army Materials and Mechanics
Research Center
Watertown, Massachusetts 02172

Mr. Joseph Blue
Headquarters, DLA-SCT (2)
Defense Logistics Agency
Cameron Station
Alexandria, Virginia 22314

Mrs. Frances Burke/PAEC-223
Defense Electronics Supply Center
1507 Wilmington Pike
Dayton, Ohio 45401

Mr. Robert Braden
Mechanical Properties Data Center
13919 West Bay Shore Drive
Traverse City, Michigan 49684

Dr. John F. Kahles
Machinability Data Center
3980 Rosslyn Drive
Cincinnati, Ohio 45209

Dr. George J. Zissis
Infrared Information and Analysis Center
University of Michigan
Willow Run Laboratories
Ann Arbor, Michigan 48107

Mr. Ronald D. Brown
Chemical Propulsion Information Agency
The Johns Hopkins University
8621 Georgia Avenue
Silver Spring, Maryland 20910

Dr. Richard Smith
NonDestructive Testing Information
Analysis Center
Southwest Research Institute
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P.O. Drawer 28510
San Antonio, Texas 78284

Dr. Y. S. Touloukian
Thermophysical Properties Research Center
Purdue University
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West Lafayette, Indiana 47906

Dr. Charles Ehrenfried
Reliability Analysis Center, RBRAC
Griffiss AFB, New York 13440

Mr. Harry Pebly
Plastics Technical Evaluation Center
Picatinny Arsenal
Dover, New Jersey 07801

Mr. Charles Smoots
GACIAC
IIT Research Institute
10 West 354th Street
Chicago, Illinois 60616

Mr. Jerome Persh
Staff Specialist, Materials and Structures
Office of Under Secretary of Defense for
Research and Engineering (ET)
Room 3D1089, The Pentagon
Washington, D.C. 20301

Defense Documentation Center
Cameron Station (2)
Alexandria, Virginia 22314

Chief, DCASMA
Contract No. DSA900-76-C-2471
Defense Electronics Supply Center
Dayton, Ohio 45444

Army Materials and Mechanics Research Center
Watertown, Massachusetts 02172

AD

ANNUAL REPORT OF THE
METALS & CERAMICS INFORMATION CENTER
H. Mindlin, J. F. Lynch, Metals & Ceramics
Information Center, Battelle-Columbus,
Columbus, Ohio

UNCLASSIFIED
Unlimited Distribution

Key Words
Technical Information Center
Metals

Technical Report AMMRC TR 78-35
July 1978
Contract DSA900-76-C-2471
May 1, 1976, to April 30, 1978

Ceramics
Composites
Information retrieval

This report reviews the continuing operations and development of the Metals and Ceramics Information Center for the period of May 1, 1976, through April 30, 1978. Activity and growth of the Center are discussed in terms of the major work areas: Information, Operations, Products and Services, Service-Charge Program, Marketing, and Management. Future plans for the Center also are included.

Army Materials and Mechanics Research Center
Watertown, Massachusetts 02172

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Watertown, Massachusetts 02172

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